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Computer Program Uses Monte Carlo Techniques for Statistical System Performance Analysis

The problem:

To design a computer program that will determine the effect of a component part of a unit upon the overall performance of a system.

A study was initiated to determine statistically the minimum control engine deflection necessary to satisfy an established stability criterion for stage S-II flight between first and second plane separation. The minimum deflection was to correspond to an absolute stability limit below which the vehicle would be considered uncontrollable. Although the usual method for utilizing component statistics in determining performance and requirements has been to use the "worst case", this approach puts unrealistic restrictions on the information obtained.

The solution:

Monte Carlo sampling techniques which utilize the full statistics of the disturbances and misalignments of each component of the system in a manner to provide unbiased results through simulated random sampling.

How it's done:

The success or failure of a component is inserted into a digital program designed to select combinations of modes of operations which are determined by generated sequences of random numbers. The combinations of system component properties are then

inserted into a mathematical description of the system's operation. The resulting performance characteristics of components are made into statistical distributions to provide overall system confidence levels.

Notes:

1. This program requires the use of a SIMSCRIPT compiler and a digital computer to furnish input information to an analog computer.
2. The program is written in SIMSCRIPT for an IBM 7094 computer.
3. Inquiries concerning this program may be directed to:

COSMIC
Computer Center
University of Georgia
Athens, Georgia 30601
Reference: B67-10306

Patent status:

No patent action is contemplated by NASA.

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